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STRUCTURE OF ELECTROMAGNETIC ELECTRICAL CONNECTION DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a National Stage Patent Application of PCT International Patent Application No. PCT/KR2012/003219 (filed on Apr. 26, 2012) under 35 U.S.C. §371, which claims priority to Korean Patent Application No. 10-2011-0039441 (filed on Apr. 27, 2011), the teachings of which are incorporated herein in their entireties by reference.

TECHNICAL FIELD

The present invention relates to an improved structure of an electromagnetic electrical connection device capable of being applied to a variety of electronic products (for example, plugs, outlets, typical or waterproof connectors, sockets, jacks, adaptors, etc.) so as to be widely used. More particularly, the present invention allows electrical or signal connection to be smoothly performed using properties of magnetic force so as to conveniently provide electrical connection and disconnection while providing effects such as noise isolation, stability, and waterproofing functions during connection of the electrical connection device, thereby significantly improving quality and reliability of the product to present a good image to a user which is a consumer.

BACKGROUND ART

The present invention is to further improve Korean Patent Application No. 2011-0002404 (entitled "The ELECTROMAGNETIC ELECTRICAL CONNECTION DEVICE") which is previously applied by the present applicant.

As well known in the art, power is connected to an outlet as an interior wiring connector so as to be supplied to a variety of electronic products requiring power. A plug is installed to an end of a cable of an electronic product such that power is shut off and the cable is arranged when the plug is decoupled from the outlet, thereby easily transporting and storing the electronic product. Power is supplied to the electronic product when the plug is connected to the outlet, and thus the electronic product operates.

In a plug and an outlet as conventional power connection mechanisms related to such an art, as shown in FIG. 1, a plug 40 is installed to a cable 41 joined to an electronic product and plug terminals 40a protrude from an end of the plug 40. An outlet 50 is installed such that the plug terminals 40a of the plug 40 are inserted into the outlet 50. The outlet 50 is formed, at the front thereof, with a hole 51 and terminal insertion grooves 52 are symmetrically formed on a bottom surface of the hole 51.

In the conventional plug and outlet, the cable is connected, at one end thereof, to a power supply of the electronic product while being provided, at the other end thereof, with the plug 40, and the plug terminals 40a protrude from the end of the plug 40. When the plug terminals 40a of the plug 40 are inserted into the terminal insertion grooves 52 formed in the hole 51 of the outlet 50, the plug terminals 40a are electrically connected to connection pieces which are installed inside the terminal insertion grooves 52 to be connected to power, thereby supplying the power to the electronic product.

The plug 40 and the outlet 50 as the power connection mechanisms which are inserted and fastened as described above are inconvenient in that, when the plug 40 is fitted into the outlet 50 in the dark and narrow place, the plug terminals

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40a of the plug 40 are exactly inserted into the terminal insertion grooves 52 of the outlet 50.

In addition, when the plug terminals 40a of the plug 40 are tightly inserted into the terminal insertion grooves 52 of the outlet 50, large force is required to decouple the plug 40. Furthermore, since there is a need to pull the cable joined to the plug 40 when the plug 40 is well not decoupled from the outlet 50, a short circuit may be generated at a connection part between the plug and the cable.

Meanwhile, the terminal insertion grooves 52 into which the plug terminals 40a of the plug 40 are inserted in the hole 51 of the outlet 50 are always opened. Accordingly, when children insert conductive objects into the terminal insertion grooves 52 due to curiosity, an electric shock accident may be caused. In addition, when foreign matters are inserted into the terminal insertion grooves 52, the plug terminals 40a of the plug 40 may not be inserted into the terminal insertion grooves 52.

The solution of the above-mentioned problems is disclosed in Korean Unexamined Patent Application Publication No. 2002-0080766 (Korean Patent Application No. 2001-0020525) of the relate art.

That is, the above relate art is constituted as shown in FIG. 2. A plug insertion portion 4 having a groove shape is formed in a case 3 of an outlet 2, and a plurality of power terminals 5 and 5' are formed on the plane within the groove of the plug insertion portion 4. The plug insertion portion 4 is provided therein with first magnets 6 and 6' to fix a plug 1 by magnetic force, and the plug 1 is provided with second magnets 7 and 7' to fix the plug 1 to the plug insertion portion 4 by attractive force acting on positions corresponding to the first magnets 6 and 6'.

In addition, the plug 1 is formed with a plurality of plug terminals 8 and 8' on the contact surface of the plug 1 so as to correspond to the plural power terminals 5 and 5' formed within the plug insertion portion 4. The case 3 of the outlet 2 is formed therein with safety switches 10 and 10' which turn on/off power by magnetic force, and the plug 1 is formed with third magnets 9 and 9' to operate the safety switches 10 and 10' by magnetic force. In this case, the safety switches 10 and 10' include first contact 11 and 11' connected to the power terminals 5 and 5', second contacts 12 and 12' connected to power supply lines 20 and 20', switch portions 13 and 13' which move by magnetic force of the third magnets 9 and 9' and connect the first contact 11 and 11' to the second contacts 12 and 12', and elastic bodies 14 and 14' which are elastic restoring means to return the switch portions 13 and 13' to original positions when the magnetic force of the third magnets 9 and 9' do not affected thereto, respectively. In this case, the switch portions 13 and 13' are ferromagnetic bodies and conductive substances, and are configured to be moved by attractive force acting between the third magnets 9 and 9' and the switch portions 13 and 13'.

However, the switch portions 13 and 13' may also be moved by installing magnets to the switch portions 13 and 13' such that repulsive force acts between the third magnets 9 and 9' and the switch portions 13 and 13'. In addition, in order to easily adjust contact positions between the power terminals 5 and 5' and the plug terminals 8 and 8', the related art is configured such that the contact positions may be exactly adjusted by attractive force by forming concave-convex portions at the installation positions of the first magnets 6 and 6', the second magnets and 7', and the third magnets 9 and 9'. However, the related art may also be configured such that coupling directions and positions between the power terminals 5 and 5' and the plug terminals 8 and 8' may be exactly